**WHAT IS CLAIMED IS:**

1. A wavelength division multiplexer/demultiplexer comprising:

a first sub-waveguide having a width that gradually increases in a progressing direction of an optical signal; and

a second sub-waveguide having a width that gradually decreases in the progressing direction of the optical signal passing through the first sub-waveguide.

2. The wavelength division multiplexer/demultiplexer as set forth in claim 1, further including a grating for demultiplexing a multiplexed optical signal to single-channel optical signals, an input waveguide for inputting the optical signal to the grating, and output waveguides for outputting the optical signals demultiplexed by the grating.

3. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein the first sub-waveguide has a parabolic horn shape.

4. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein the second sub-waveguide has a predetermined shape having a width that linearly decreases in the progressing direction of the optical signal passing through the first sub-waveguide.

5. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein the second sub-waveguide has a parabolic horn shape having a width that gradually decreases in the progressing direction of the optical signal passing through the first sub-waveguide.

6. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein a shape of the first sub-waveguide is defined by the following equation:

$$W_1 = (2\alpha\lambda_g z_1 + W_{i1}^2)^{1/2}, \alpha = -\frac{8\pi\gamma}{3},$$

wherein, $z_1$ denotes a distance from an input terminal of the first sub-waveguide to a position of a progressing optical signal, $W_1$ is a width of the first sub-waveguide at the position of the progressing optical signal, $W_{i1}$ is a width of the first sub-waveguide at the input terminal, $\lambda_g$ denotes an effective wavelength of the optical signal, and $\gamma$ denotes a coupling coefficient of the fundamental and higher modes of the optical signal.

7. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein a shape of the second sub-waveguide is defined by the Equation 9,

[Equation 9]

$$W_2 = (W_{i2}^2 - 2\alpha\lambda_g z_2)^{1/2}, \alpha = -\frac{8\pi\gamma}{3},$$

wherein, $z_2$ denotes a distance from the end of the first sub-waveguide to a position of a progressing optical signal, $W_2$ is a width of the second sub-waveguide at the position of the progressing optical signal, $W_{i2}$ is a width of the second sub-waveguide at the contact point of the first and second sub-waveguides, $\lambda_g$ denotes an effective wavelength of the optical signal, and $\gamma$ denotes a coupling coefficient of the fundamental and higher modes of the optical signal.

8. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein a shape of the second sub-waveguide is defined by the following equation:

$$W_2 = \gamma[1 - \exp(\frac{-z_2}{\alpha})] + W_{i2}, \alpha = -\frac{8\pi\gamma}{3},$$

wherein, $z_2$ denotes a distance from the end of the first sub-waveguide to a position of a progressing optical signal, $W_2$ is a width of the second sub-waveguide at the position of the progressing optical signal, $W_{i2}$ is a width of the second sub-waveguide at the contact point of the first and second sub-waveguides, and $\gamma$ denotes a coupling coefficient of the fundamental and higher modes of the optical signal.

9. The wavelength division multiplexer/demultiplexer as set forth in claim 1, wherein a shape of the second sub-waveguide is defined by the following equation:

$$W_2 = 2\alpha z_2 + W_{i2}, \alpha = -\frac{8\pi\gamma}{3},$$

wherein, $z_2$ denotes a distance from the end of the first sub-waveguide to a position of a progressing optical signal, $W_2$ is a width of the second sub-waveguide at the position of the progressing optical signal, $W_{i2}$ is a width of the second sub-waveguide at the contact point of the first and second sub-waveguides, and $\gamma$ denotes a coupling coefficient of the fundamental and higher modes of the optical signal.

10. A wavelength division multiplexer/demultiplexer for use in a planar lightwave circuit (PLC) having an arrayed waveguide grating including a plurality of optical waveguides, an input waveguide for inputting a multiplexed optical signal to the grating, and output waveguides for outputting single-channel optical signals demultiplexed by the grating, the wavelength division multiplexer/demultiplexer comprising:

an input waveguide having,

a first sub-waveguide, in which its width gradually increases in a progressing direction of the optical signal; and

a second sub-waveguide, in which its width gradually decreases in the progressing direction of the optical signal passing through the first sub-waveguide.

11. The wavelength division multiplexer/demultiplexer as set forth in claim 10, wherein the first sub-waveguide has a parabolic horn shape.

12. The wavelength division multiplexer/demultiplexer as set forth in claim 10, wherein the second sub-waveguide has a predetermined shape having a width that linearly decreases in the progressing direction of the optical signal passing through the first sub-waveguide.

13. The wavelength division multiplexer/demultiplexer as set forth in claim 10, wherein the second sub-waveguide has a parabolic horn shape having a width that gradually decreases in the progressing direction of the optical signal passing through the first sub-waveguide.

14. The wavelength division multiplexer/demultiplexer as set forth in claim 10, wherein the input waveguide, comprising the first and second sub-waveguides, is respectively disposed on both sides of the substrate centering on the arrayed waveguide grating, and the output waveguides arranged in parallel with the input waveguide are respectively disposed on both sides of the substrate centering on the arrayed waveguide grating.